Obrazové displeje

Základní funkce obrazového senzoru a displeje

- zobrazovací systém – konverze 3D na 2D
- senzor – opto_elektrická konverze, časový multiplex
- displej – elektro_optická konverze, časový demultiplex
- zkreslení a artefakty

OBRAZOVÉ DISPLEJE

- zdroje (vnitřní modulace)
- ventily (externí zdroj světla)

OBRAZOVÉ DISPLEJE

Zdroje: (barevná teplota)

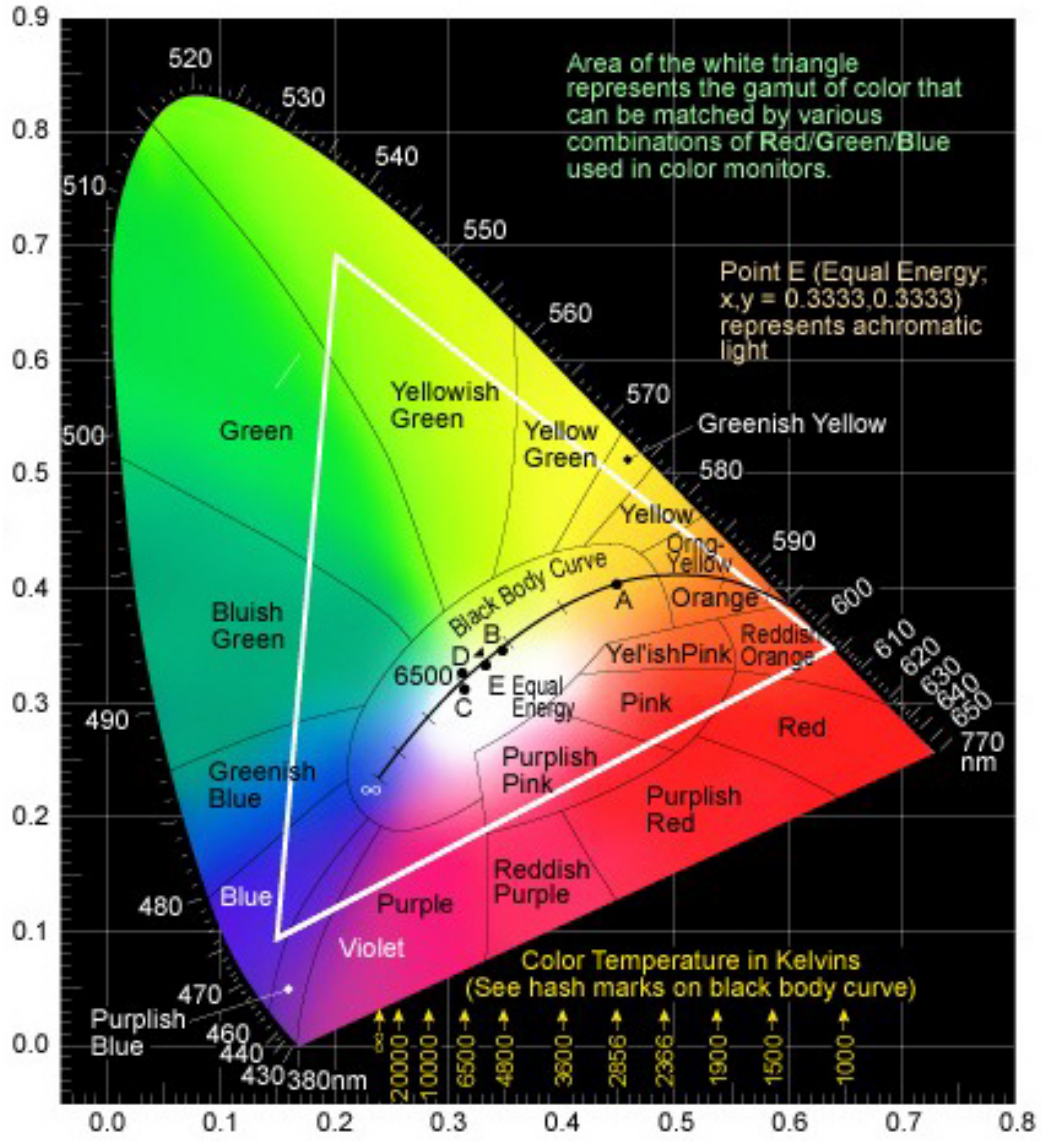
- teplotní – žárovka, Slunce
- luminiscenční - výboj v plynu Hg, Na, Xe
  - elektroluminiscence vnitřní, PN přechod
    atd. foto-, chemi-, sono-, ...

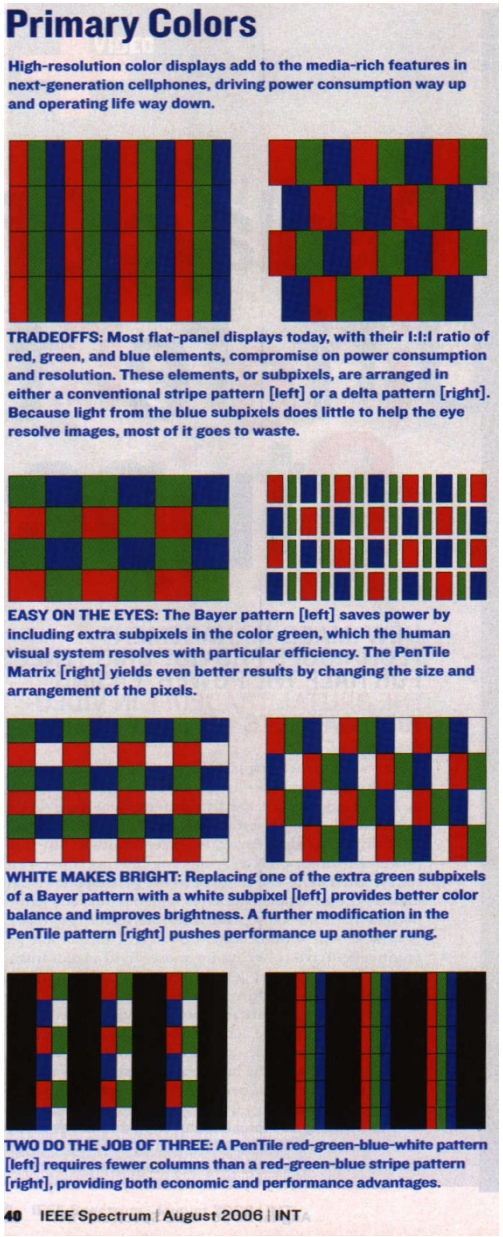
Luminiscenční prvky:

- elektroluminiscenční panel
- obrazovka (katodoluminiscence)
- LED a laserová dioda
- laserový zesilovač a laser (plynový, kapalinový, pevná fáze)

OBRAZOVÉ DISPLEJE

CIE XYZ diagram



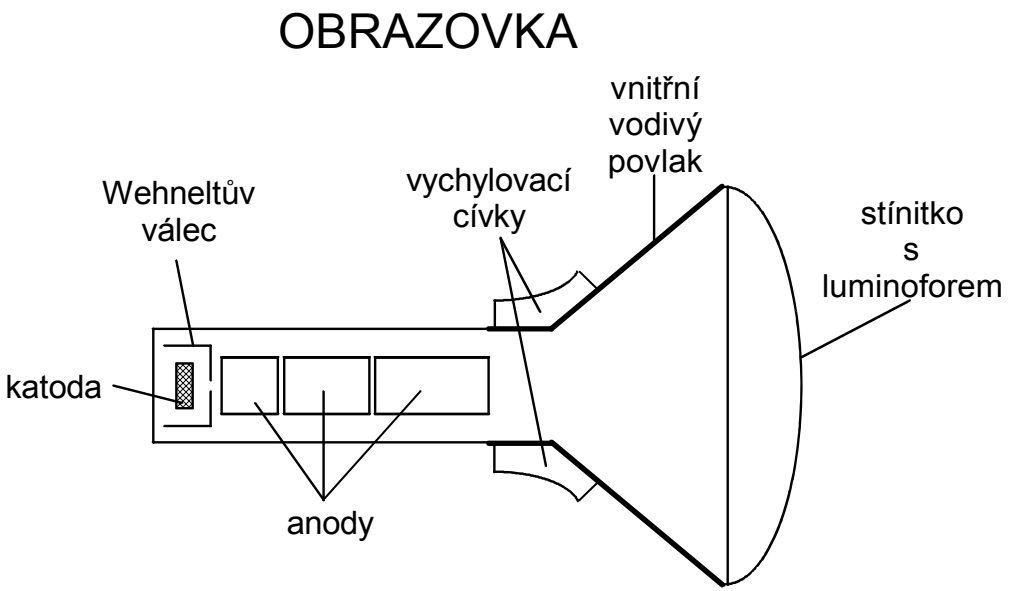

Primary Colors
High-resolution color displays add to the media-rich features in next-generation cellphones, driving power consumption way up and operating life way down.
TRADEOFFS: Most flat-panel displays today, with their I:I:I ratio of red, green, and blue elements, compromise on power consumption and resolution. These elements, or subpixels, are arranged in either a conventional stripe pattern [left] or a delta pattern [right]. Because light from the blue subpixels does little to help the eye resolve images, most of it goes to waste.
EASY ON THE EYES: The Bayer pattern [left] saves power by including extra subpixels in the color green, which the human visual system resolves with particular efficiency. The PenTile Matrix [right] yields even better results by changing the size and arrangement of the pixels.
WHITE MAKES BRIGHT: Replacing one of the extra green subpixels of a Bayer pattern with a white subpixel [left] provides better color balance and improves brightness. A further modification in the PenTile pattern [right] pushes performance up another rung.
TWO DO THE JOB OF THREE: A PenTile red-green-blue-white pattern [left] requires fewer columns than a red-green-blue stripe pattern [right], providing both economic and performance advantages.
40 IEEE Spectrum | August 2006 | INT

© CIE1931

OBRAZOVÉ DISPLEJE

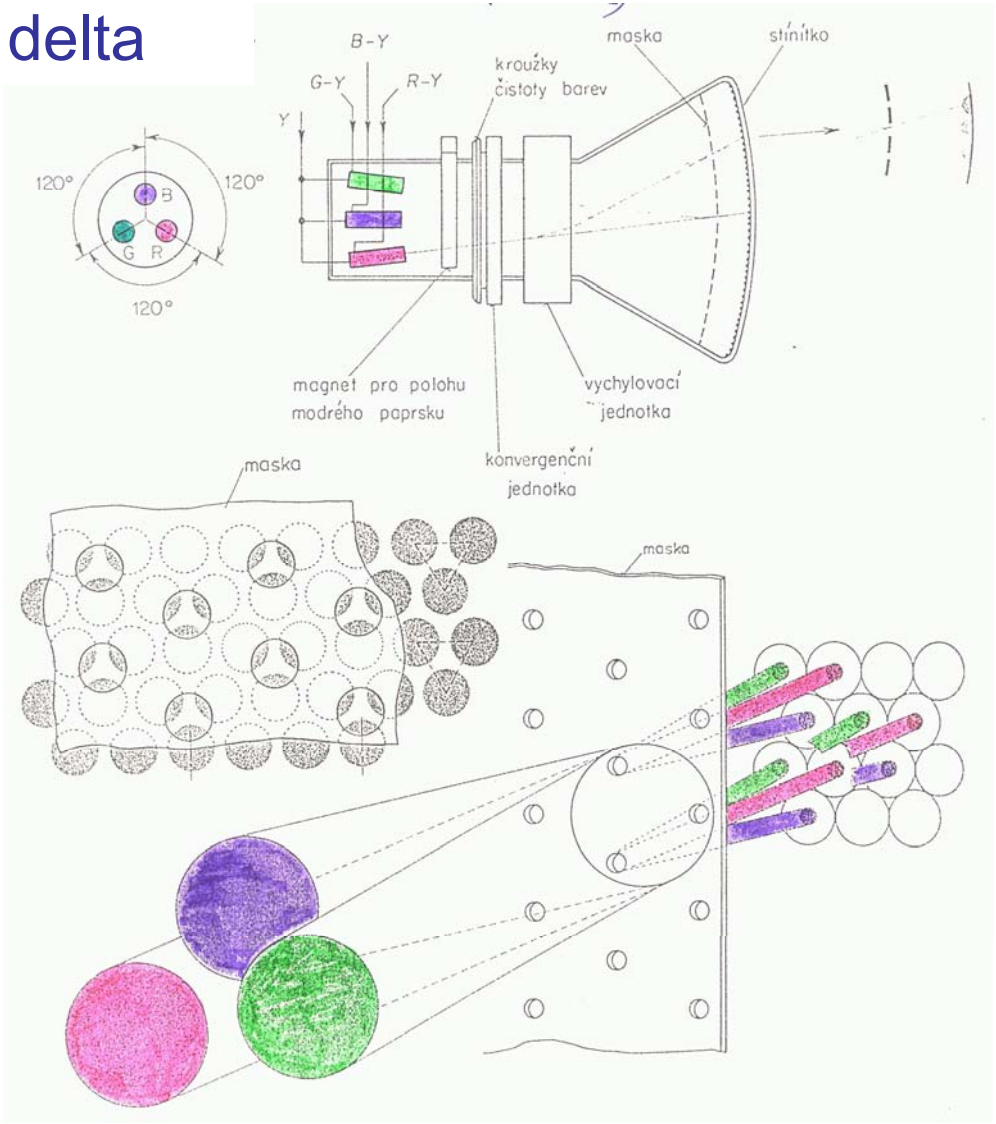
Obrazovka

- skanování po řádcích
- obraz nejvyšší kvality
- vzorkování jen vertikálně

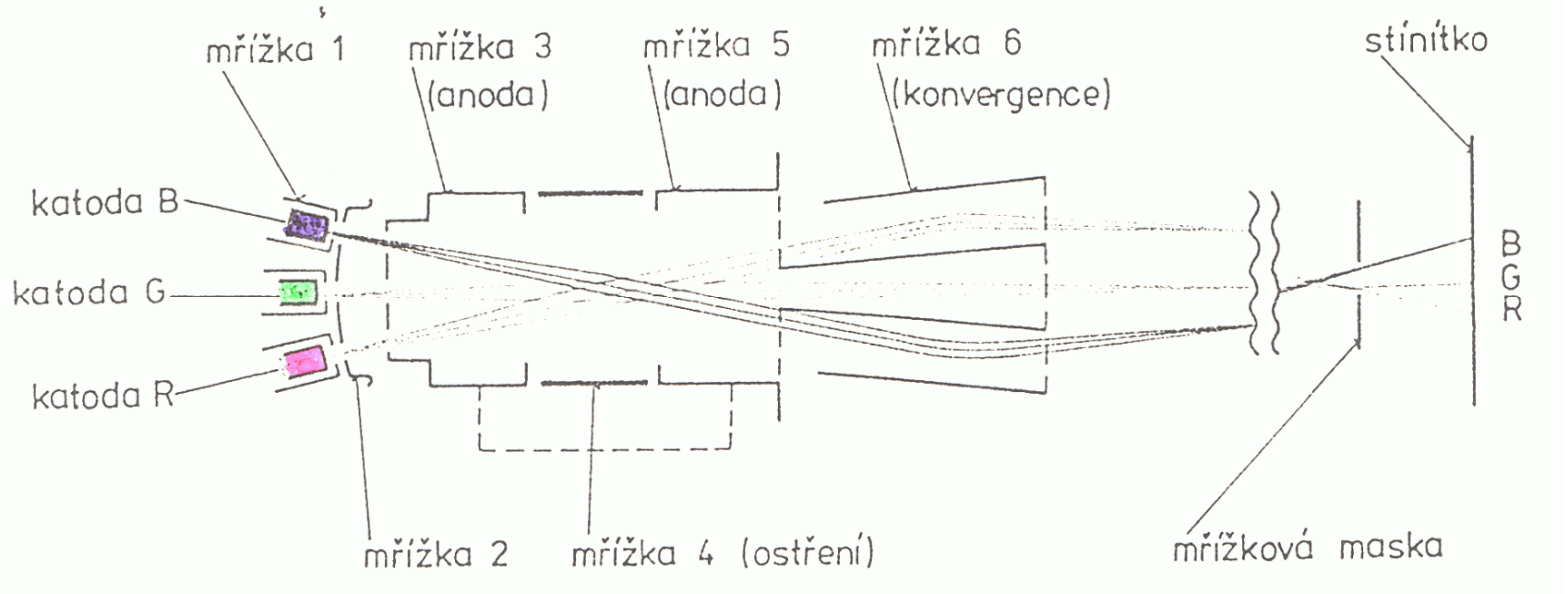


CRT

delta


B-Y
G-Y
R-Y
Y
kroužky čistoty barev
maska
stínítko
120°
120°
120°
B
G
R
magnet pro polohu modrého paprsku
vychylovací jednotka
konvergenční jednotka
maska
maska

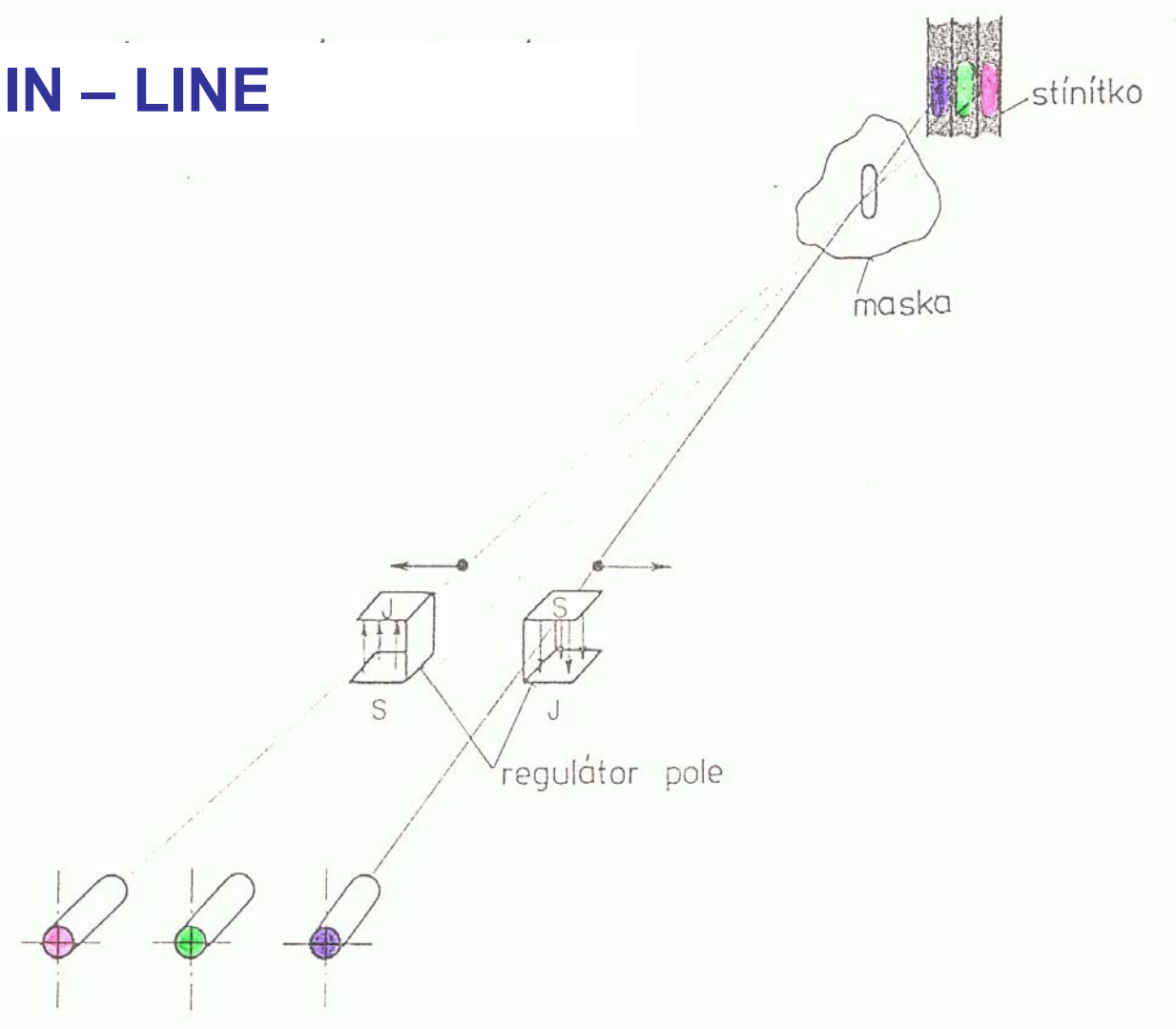
CRT



TRINITRON

CRT

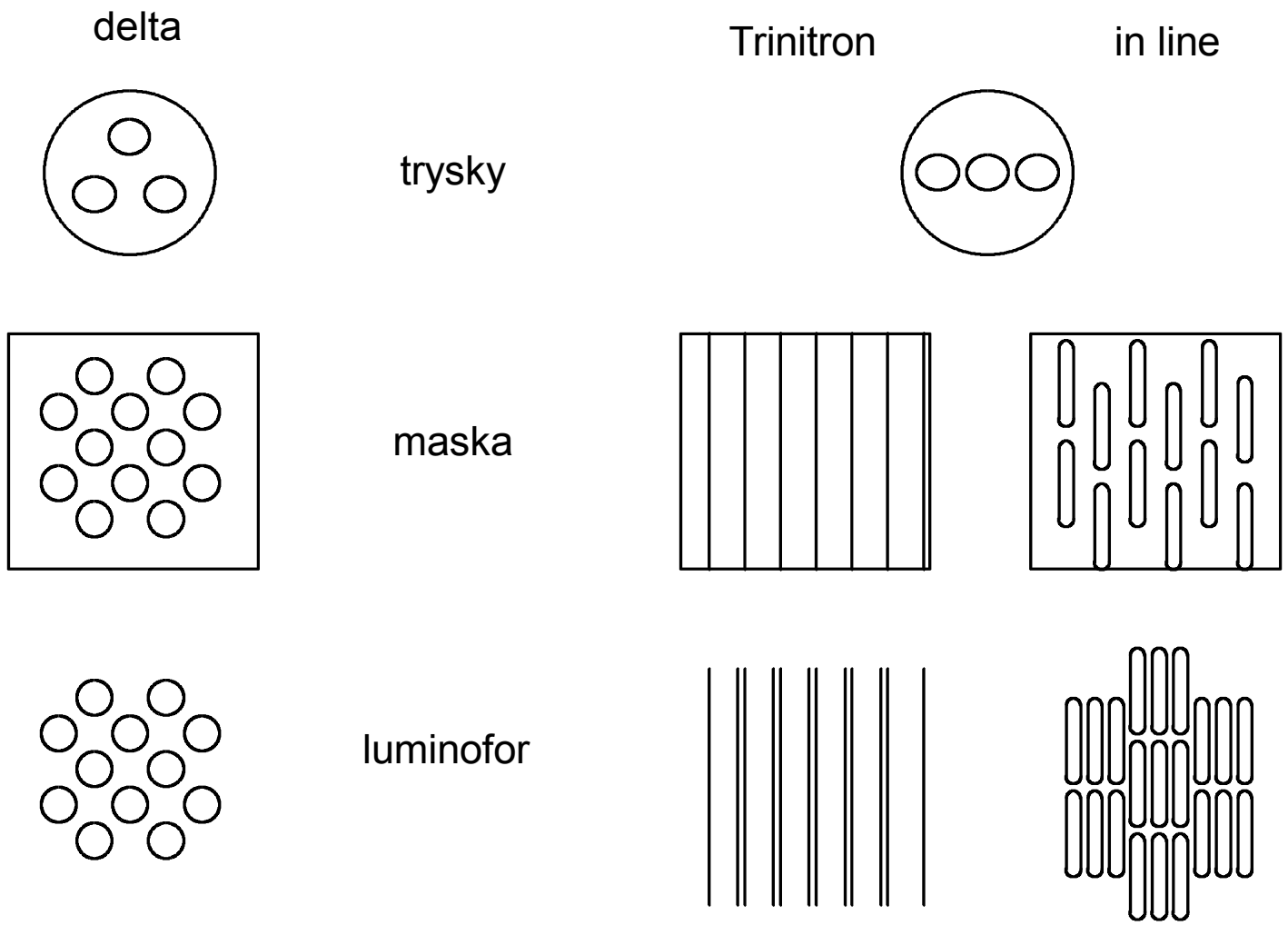
IN – LINE



OBRAZOVÉ DISPLEJE

Obrazovka

Typy barevných obrazovek



OBRAZOVÉ DISPLEJE

Barevné obrazovky - konstrukce

= 3 x čb obrazovka ve společné baňce s prostorovou separací barev pomocí masky

- DELTA obrazovka

    maska s kruhovými otvory, sférické stínítko

    trysky ve vrcholech rovnostranného trojúhelníka (delta)

    nízká energetická účinnost, velký počet nastavovacích prvků

- TRINITRON

    patent SONY, trysky v řadě, válcové stínítko

    drátová vertikální maska na masívním rámu, velká hmotnost

- IN-LINE

    trysky v řadě, sférické stínítko,

    maska s eliptickými otvory, vyšší energetická účinnost

Úpravy – potlačení odrazu vnějšího světla

    „black line”, pigmentované luminofory

LCD

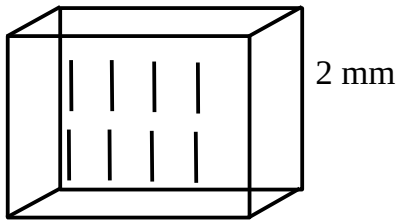
LCD – Liquid Crystal Display

- anizotropní tavenina – kapalný krystal, organické sloučeniny,
  azo- a azoxi- sloučeniny kyseliny karboxylové a esterů cholesterolu
- podlouhlé tyčinkovité molekuly
- typy:

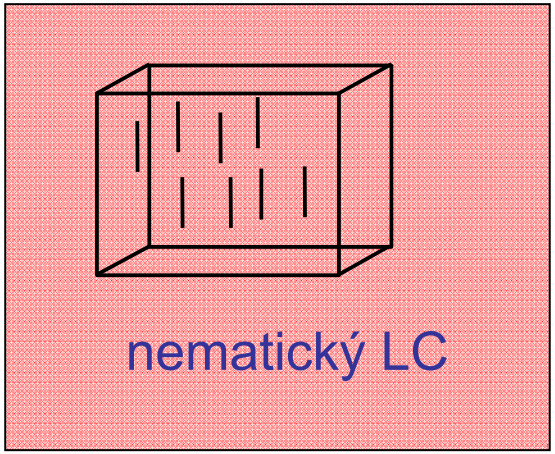
smektické – molekuly ve vrstvách, dvojlom

nematické – domény, vláknité molekuly, vliv elektrického pole

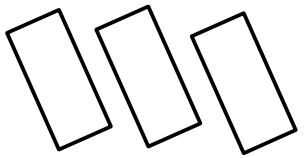
cholesterické – vrstvy pootočené typ. o 0,18°tj. 1000 vrstev o 180°
polarizace, optická mřížka, mřížková konstanta je funkcí teploty



smektický LC



nematický LC



cholesterický LC

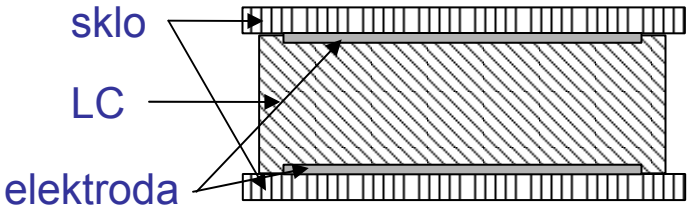
OBRAZOVÉ DISPLEJE

LCD

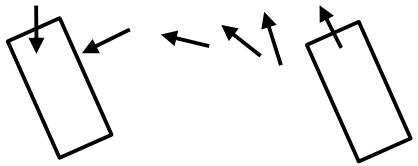
Vlastnosti:

- měrný odpor cca $10^{13}\Omega m$
- řídící napětí cca 5 V
- tloušťka vrstvy 10 až 15 μm
- pracovní teplota 0° až 60°C
- spotřeba cca 1 μA na segment 25 mm
- transparence max. 50%
- aktivní (TFT – Thin Film Transistor)

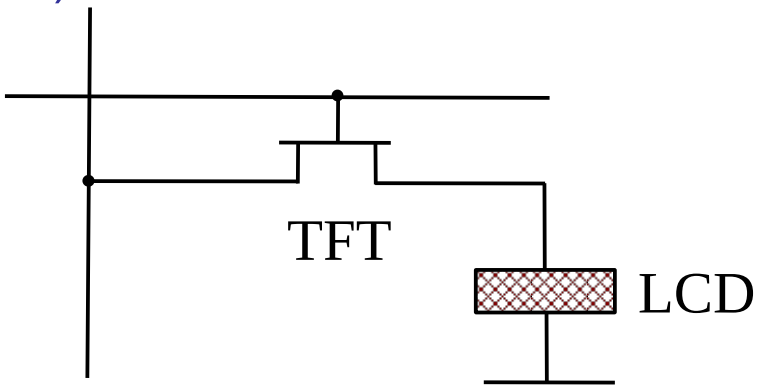
Konstrukce:



průhledná elektroda
ITO = In + Sn + O



twistová nematická struktura
(orientace povrchu- leštění)

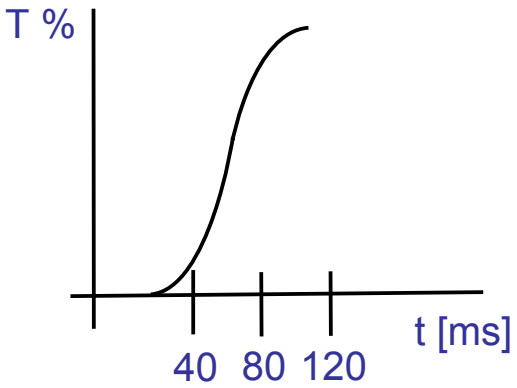


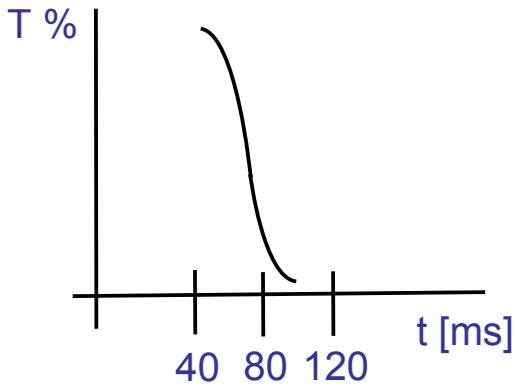
aktivní TFT displej s XY adresací

OBRAZOVÉ DISPLEJE

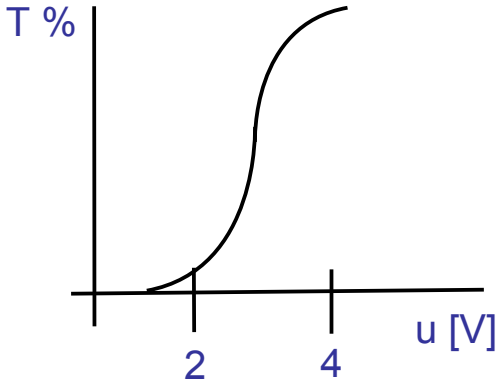
LCD

Dynamické vlastnosti





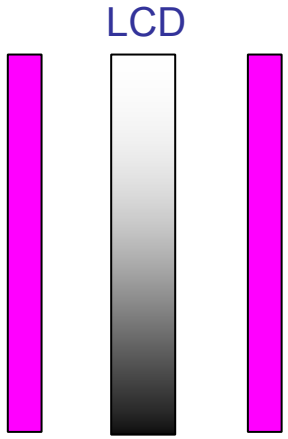
Převodní charakteristika



Transparentní verze

u = 0 světlé pole

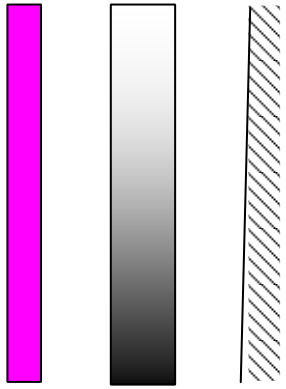
LCD stáčí o 90°



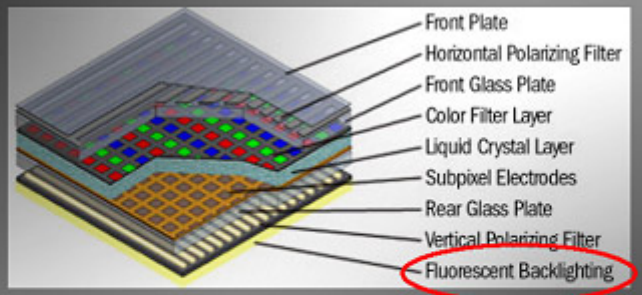
Reflexní verze

u = 0 tmavé pole

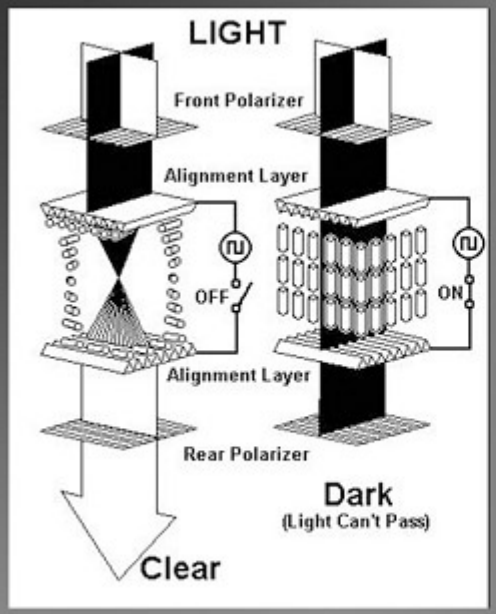
LCD stáčí o 45°



OBRAZOVÉ DISPLEJE

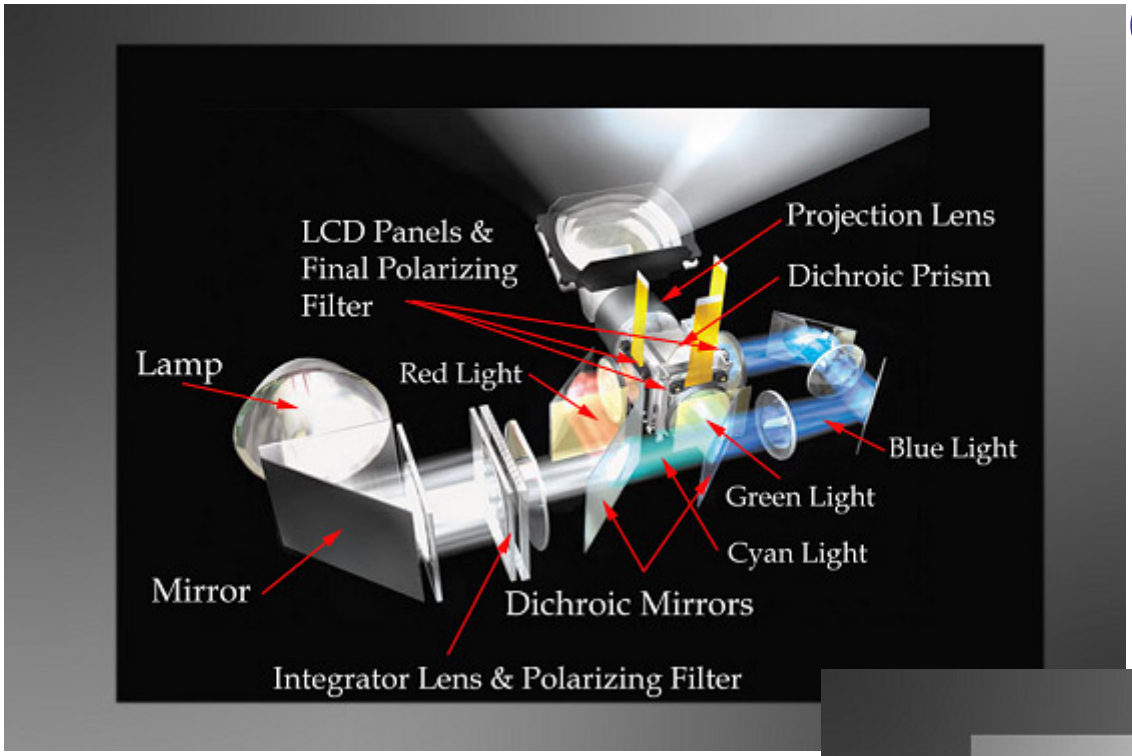


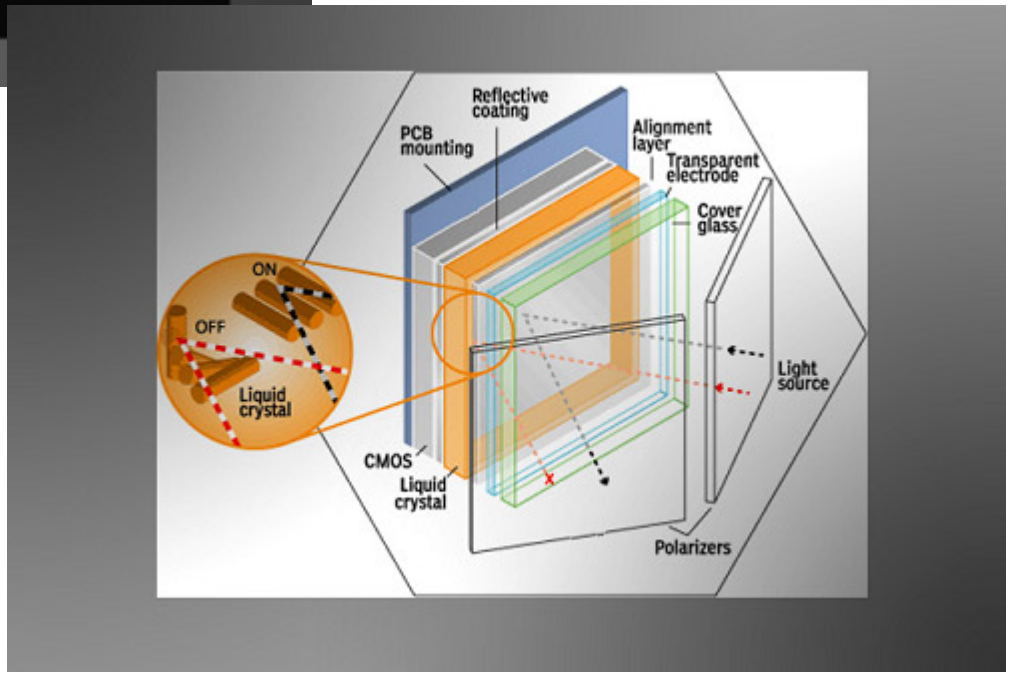
LCD Flat Panel Display



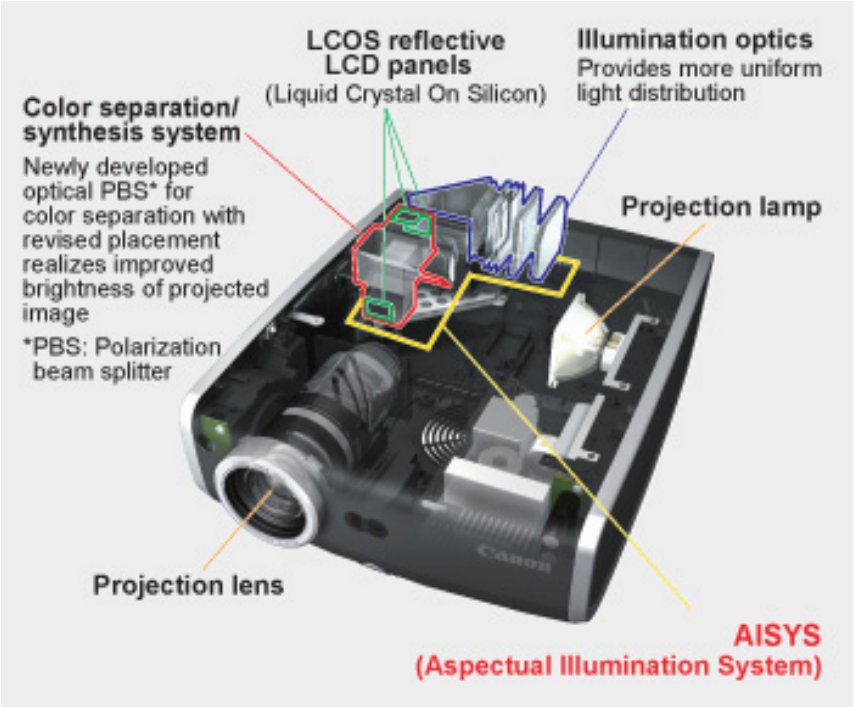
When no current is added, the liquid crystals twist the polarized light allowing it to pass through the next polarizing filter. When current is added, the crystals align themselves so that the light is passed straight through and are then blocked by the final polarizing filter.

OBRAZOVÉ DISPLEJE





LCD



Projektor

© CANON

LCD

VPL-FX51
- 5200 ANSI lm
- kontrast 850:1

Model Number: **VPL-VW200**

BRAVIA® SXRD™ 1080p Home Cinema Front Projector

VPL-VW200 features: Full HD 1080p, Motionflow™ 120Hz with black frame insertion, 35,000:1 contrast ratio (with Advanced Iris), BRAVIA Engine™ PRO, SXRD chip, x.v.Color™ capability, Carl Zeiss® multi-element glass lens, 12-bit Panel Drive Full Digital Chassis, ARC-F Lens, Real Color Processing, Anamorphic Zoom mode, 400W Pure Xenon Lamp, 1080/24p input capable

In stock. Estimated ship date: 03/25/2008.

Additional Images

© SONY

LCD

Panasonic ideas for life

CLOSE WINDOW

TC-37LZ85

NEW SIZE! 37" Class (37.0" Diagonal) Widescreen VIERA LCD 1080p HDTV with Game Mode, Built-In SD Card Slot / GalleryPlayer® Ready to View, 178° Wide Viewing Angle, Intelligent Scene Controller, 3 HDMI Inputs and VIERA Link® HDAVI Control.

VIDEO:	
Screen Size	37" Class (37.0" diagonal)
Display Resolution	1080p
Contrast Ratio	Up to 10000:1
Compatible Signal Formats	1080p/1080i/720p/480p
Panel	IPS Alpha 1080p (WSXGA)
Aspect Ratio	16:9 (Widescreen)
Aspect Control	480i/p: Full, Just, 4:3, Zoom 1080i/p: Full, H-Fill, Just, 4:3, Zoom
Resolution (Number of Pixels)	2,073,600 (1,920 x 1,080) pixels
Brightness (Panel, cd/m^2)	500
Viewing Angle	178°
Moving Picture Response Speed	6.7ms
Digital Comb Filter	Yes
Progressive Scan	Yes
3D Color Management	Yes (Vivid Mode)
Sub Pixel Control	Yes
Intelligent Scene Controller	Yes
Motion Picture Pro	No
Screen Coating/Filter	AG Filter

LCD

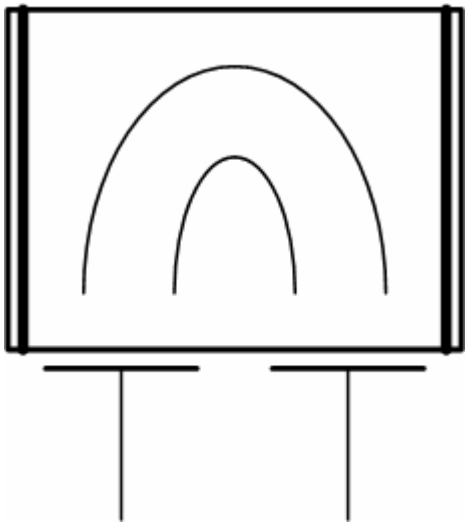
SAMSUNG LE70F96BD LCD 70/177 cm

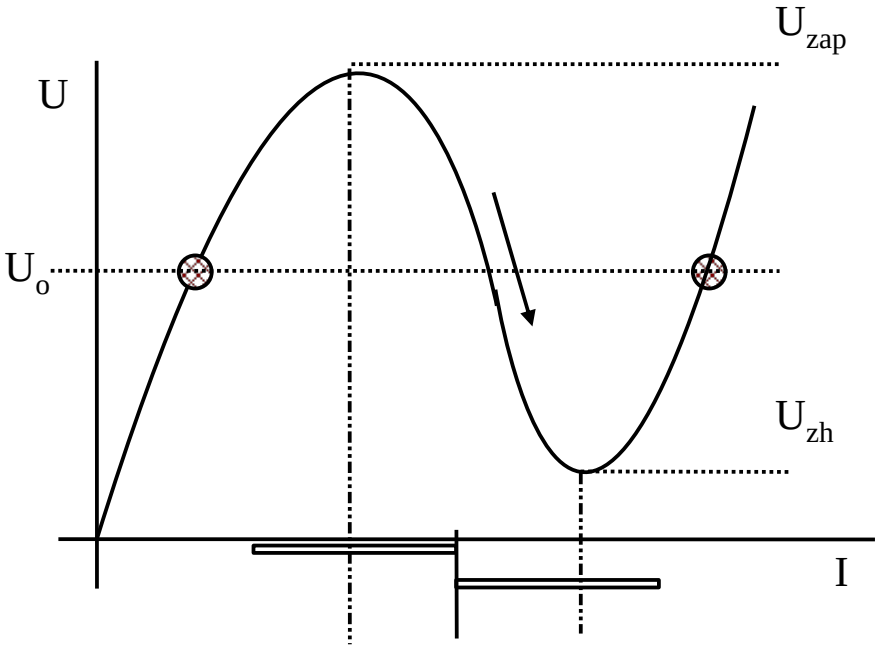
Full HD 1920 x 1080p, kontrast 1:500000, LED Smart Lighting

Plasma

Výbojové (plazmové) displeje

- střídavý výboj v plynu o tlaku 10^3 až 10^4 Pa (dříve i ss)
- směs plynů Ne + Ar, He, Xe – nízké zápalné napětí
- adresace XY
- bistabilní cyklus výboje – jednobitová paměť





Plasma

Výbojové (plazmové) displeje

- střídavý výboj v plynu o tlaku 10^3 až 10^4 Pa (dříve i ss)
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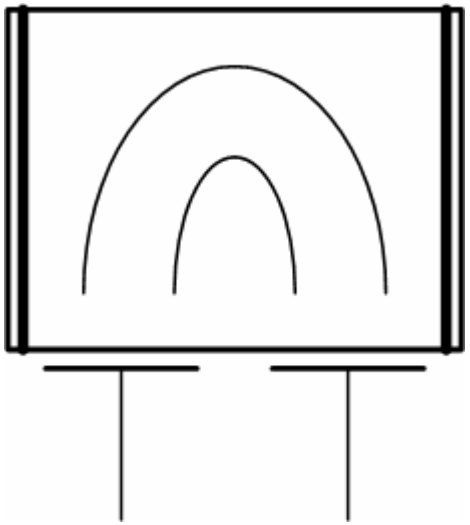
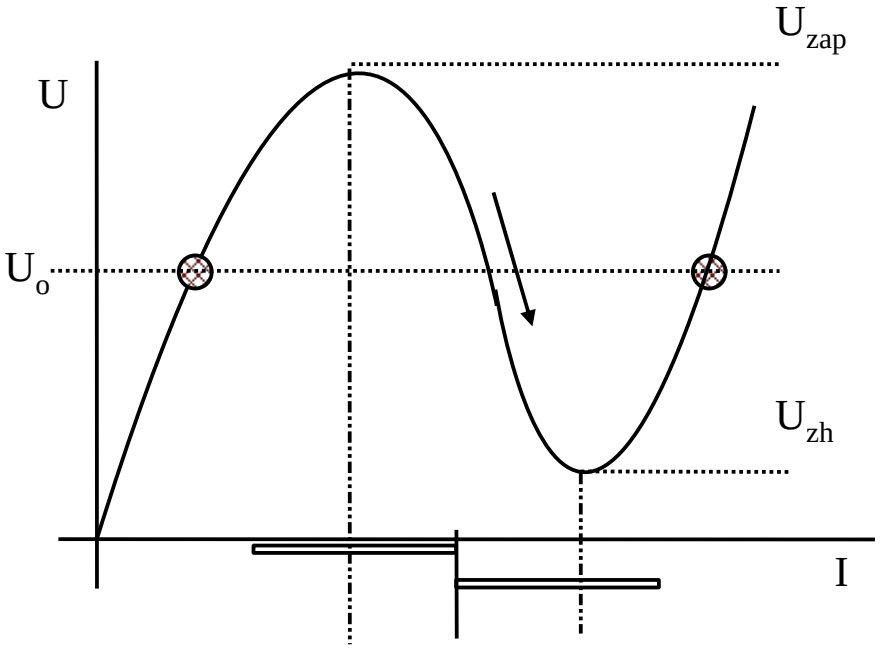
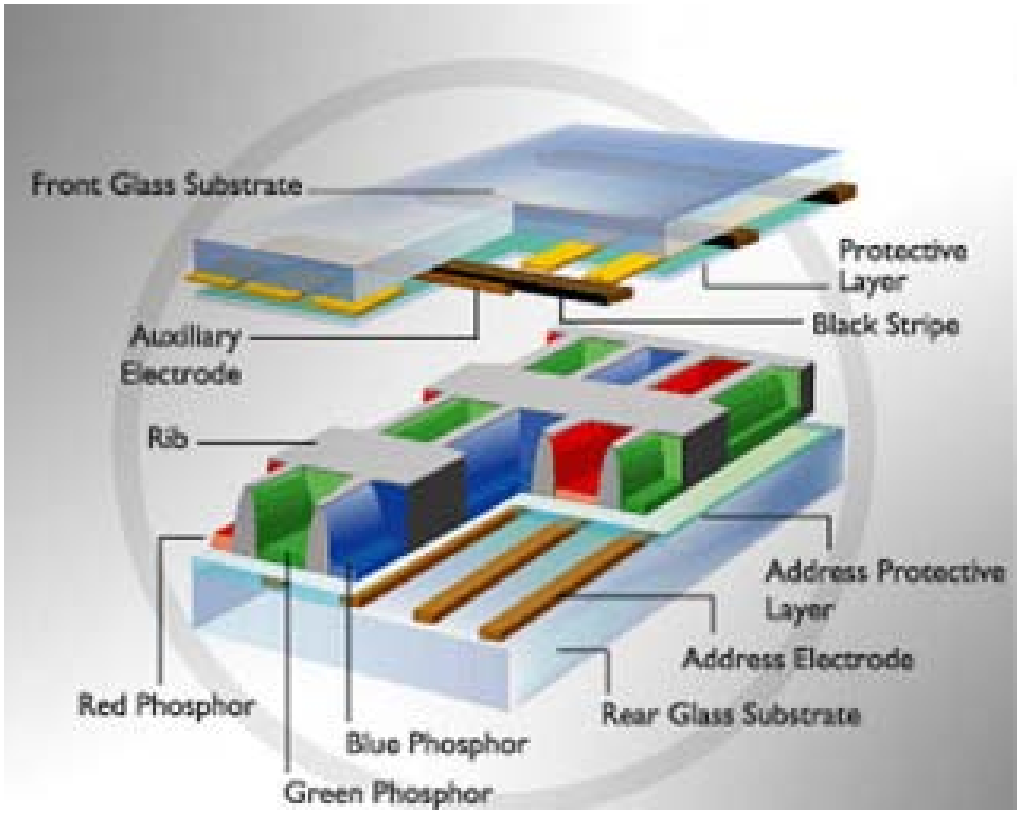
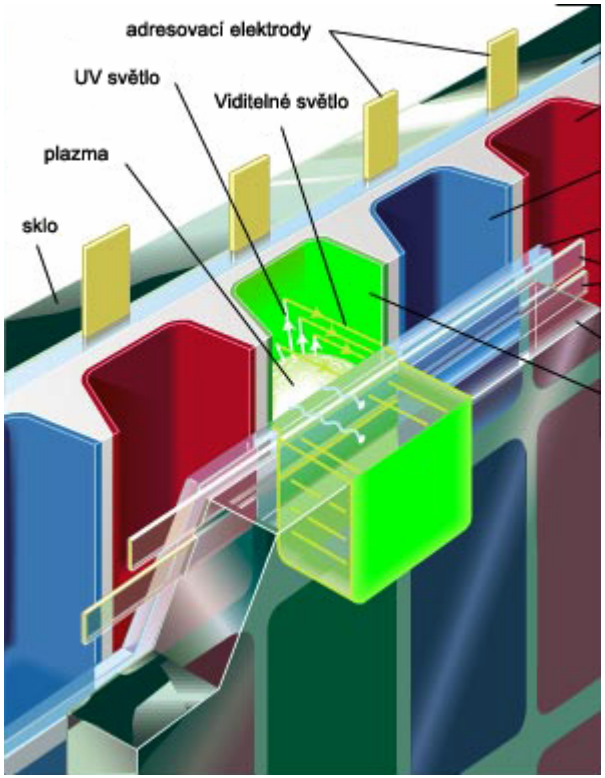




Plasma

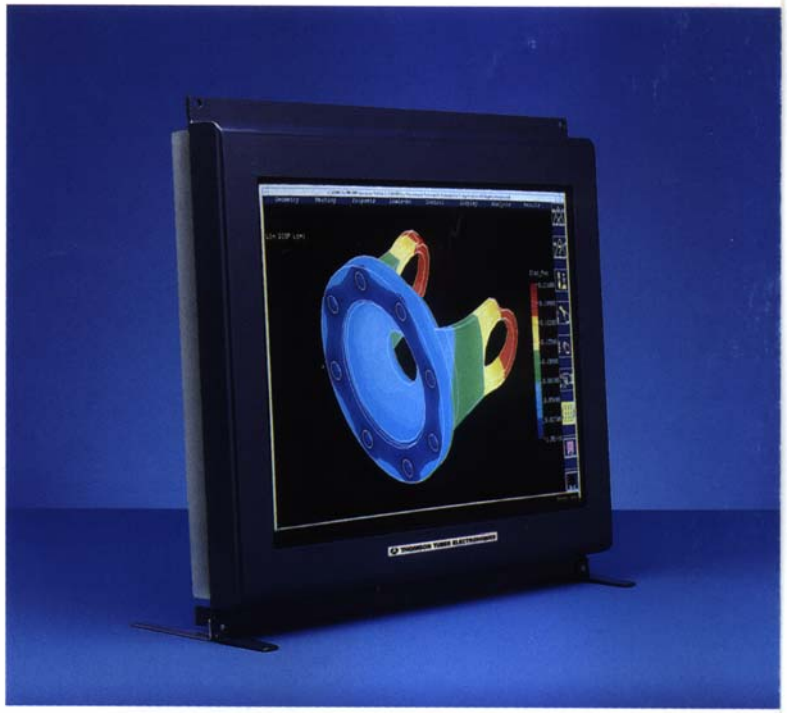




© hwmag.cz

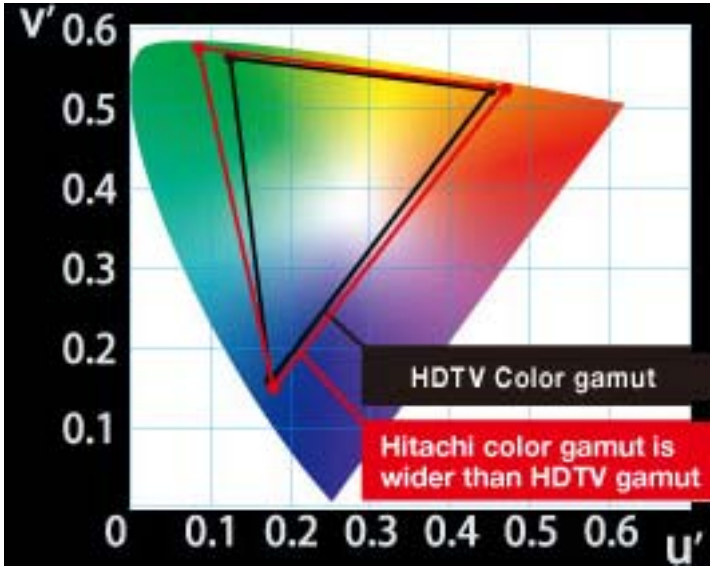
OBRAZOVÉ DISPLEJE

19″ – 1024 x 768 pixels



24″ – 1024 x 1280 pixels

Plasma



Hitachi P60XR01 plasma 152 cm, 1920 x 1080, kontrast, 1:8000, 800 nt

© HITACHI

Plasma

P60XR01

design subject to change

design subject to change

Speakers as optional accessory

P60XR01 Technical Specifications

PICTURE	
Screen Size	60" (152cm V)
Screen Type	PDP
Resolution (Pixels)	1920 x 1080
Advanced Image Technology	PICTURE MASTER Full HD
Panel Luminance (Typical) (cd/m²)	800 cd/m2
Contrast Ratio	8000 :1
HD Ready	●
PaP/PaT/PinPC	●/●/●
Pixel Pitch (HxV) (mm)	0.696 x 0.696
Aspect Ratio	16:9
TUNER	
Programmes (Analogue/Digital)	200/500
Cable/Hyperband	●/●
VHF	●
UHF	●
Text Pages	2000
VIDEO SIGNAL INPUT	
PAL/PAL60	●
SECAM	●
NTSC4,43/3.58	●/●
1080p 24/50/60	●/●/●
1080i-50/60	●/●
720p-50/60	●/●
576p/576i	●/●
480p/480i	●/●
VIDEO CONNECTIONS	
HDMI Input (HDCP)	3 (1 x Front, 2 x Rear)
SCART Socket (RGB)	3 (2)
Component Video	●
Progressive Input (PAL/NTSC)	●/●
S-VHS Video	●
Composite Video	●
Video Line Out (Phono)	●
Video Line Out (Tuner via SCART)	●
SD Card Reader	●
USB Socket	●
SPEAKERS (OPTIONAL ACCESSORY)	
Dimensions (W x H x D)	110 x 950 x 90mm
Weight	3.8Kgs (each)
Speakers in each enclosure	2 x 100mm Woofer + 25mm Dome
Frequency Range	48Hz to 20KHz
Power Handling	20w
Impedance	6Ω
AUDIO	
RMS Output	27W
Sound Effect	BBE, SRS, Focus
TRUBASS	●
1 Bit Digital Amp	-
Dynamic Bass	-
AUDIO CONNECTIONS	

© HITACHI

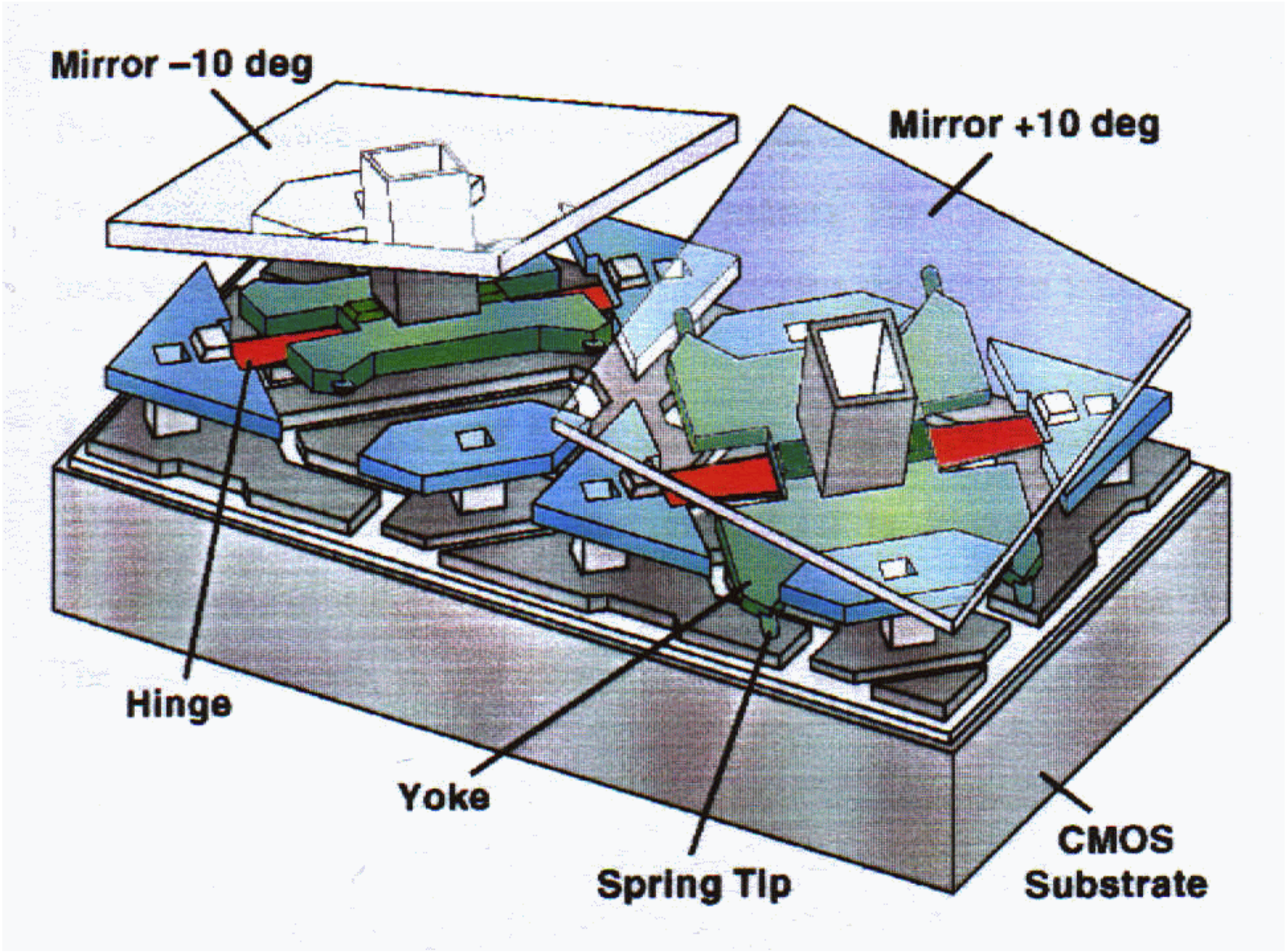
OBRAZOVÉ DISPLEJE

Digital Mirror Device DMD – Texas Instruments

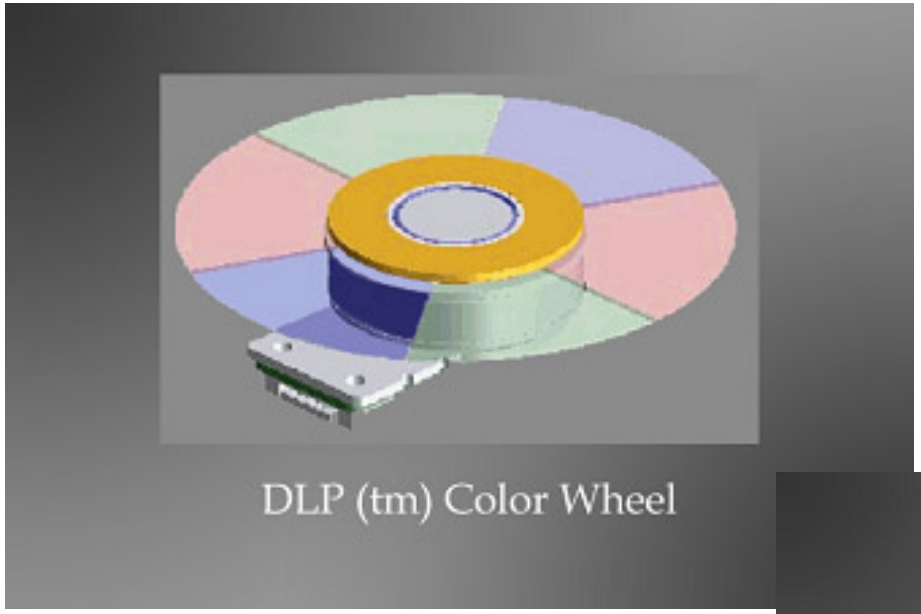
pole elektrostaticky vychylovaných mikrozrcátek

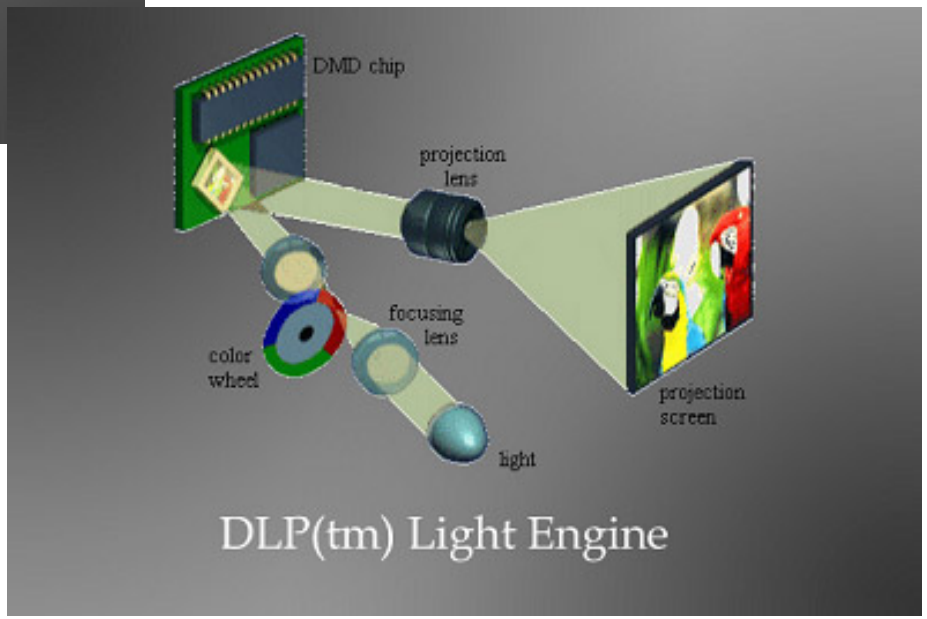
- úhel vychýlení ± 10°
- rozlišení až 4k
- velikost bodu 16 x 16 μm
- činitel plnění 74 %
- rychlost odezvy 10 μs, šedotónová reprodukce PŠM
- sčítání barev časově sekvenčně
- optická účinnost 60%
- snímková frekvence až 180 Hz
- starší idea – deformovatelné zrcadlo

OBRAZOVÉ DISPLEJE

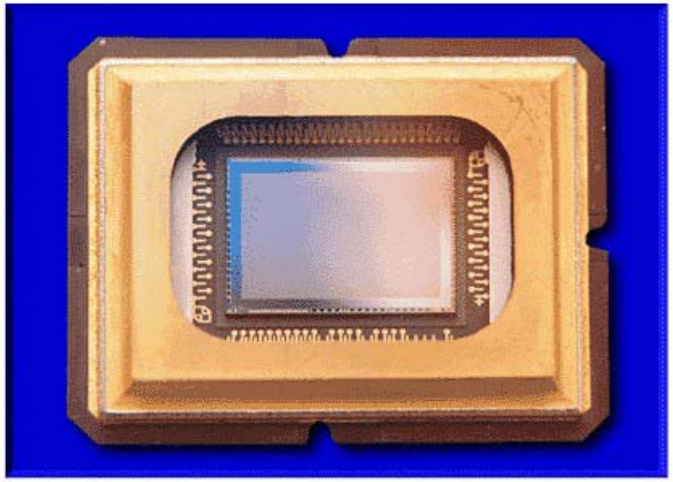


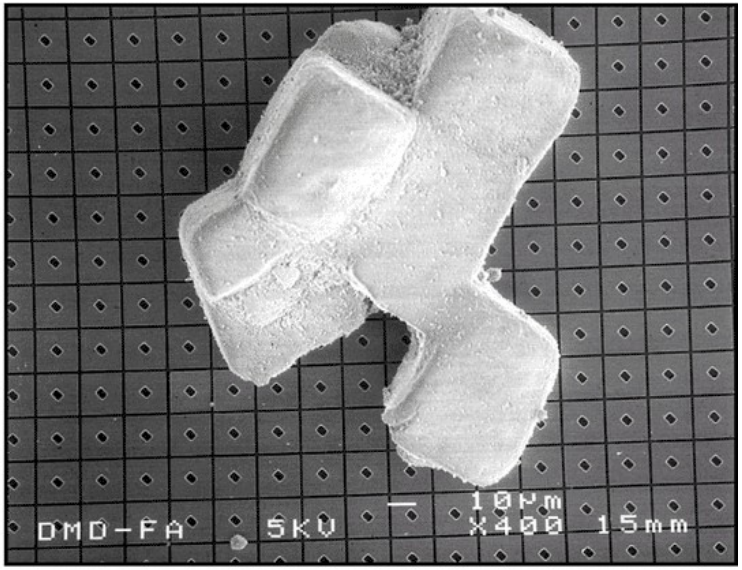
OBRAZOVÉ DISPLEJE





DLP





Pojedyńczy kryształ soli umieszczony na układzie DMD

© NEC

DLP

PT-AX200U-EC

2000 ANSI Lumens

Widescreen High Definition Home Theater Projector

Smooth Screen Technology

6000:1 Contrast Ratio.

© PANASONIC

DLP

NEC Empowered by Innovation

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NEC Display Solutions

- Hlavní strana
- Korporátní informace
- Produkty
  - Produktová nabídka
  - Produktová řada - LCD
  - Projectors
  - Plasma Displays
  - Accessories
  - Ocenění
- Kde zakoupit
- Produktová řešení
- Servis a podpora
- Tiskové zprávy
- See more - vidět více
- Kontakt
- Mapa stránek

NP4001

Rozlišení: 1280x768

Svitivost: 4500 ANSI Lumen

Kontrastni poměr: 2100:1

Životnost lampy: 5000 hodin, 2500 hodin v Eco módu

- Hlavní
- Details
- Ke stažení
- Media
- Technologie
- Accessories

Price: 158 393 Kč *
*Doporučená koncová cena (cena neobsahuje DPH)

Hlavní	
opt	Rozdzielczość optymalna: 1280 x 768 pikseli
max	Maximum resolutions: 1600x1200 (UXGA)
	4500 ANSI Lumens
	2100:1 DinamicBlack
	2 colour wheels for different applications
	Motorized zoom
	Motorized focus
	Direct Power-Off function

DLP

DP-3000

Technical specifications

Digital Micro Mirror devices	3 x 1.2" DC2K dark metal devices
Native resolution	2048 x 1080
Housing	hermetically sealed DMD's and optical assembly
Pedestal	universal pedestal (optional)
Lamps	1.5kW - 7kW Xenon lamp size
Lamp power	1.5kW - 7kW
Screen width (screen gain 1:8) @14ftL *	30m - 100ft
Screen width (screen gain 1:3) @14ftL *	25m - 83ft
(*) = ± 10 variation possible between units	
Contrast	2000:1

BARCO

DLP

TOSHIBA 65HM167, 1080p

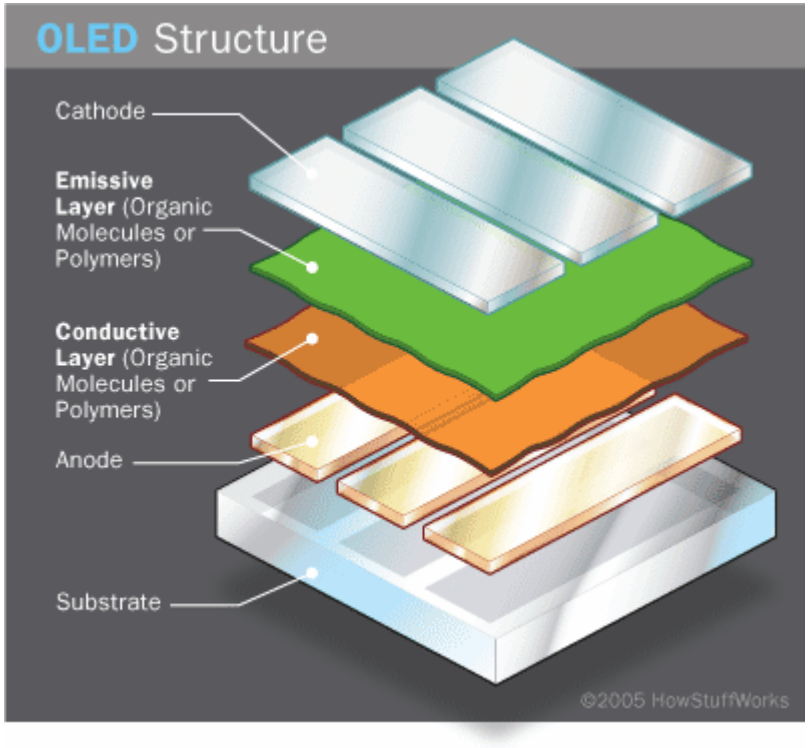
JVC DLA-QX1G

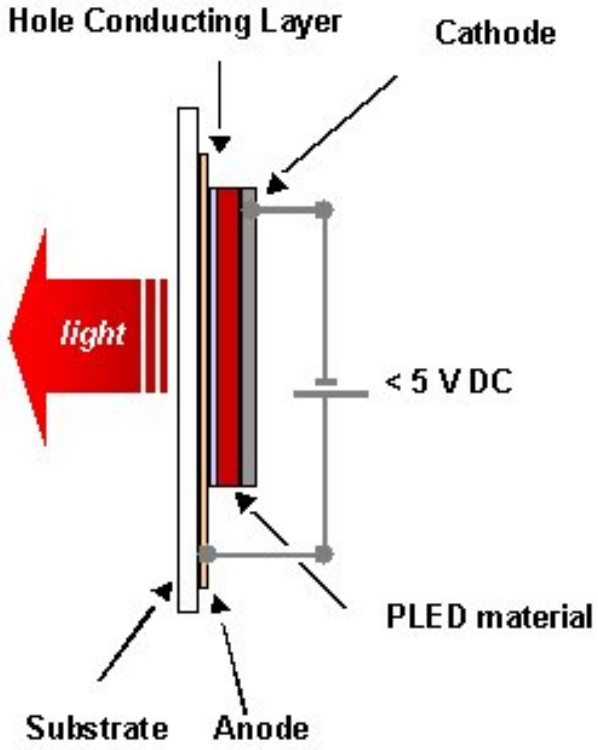
-7000 ANSI lm

- kontrast 1000:1

- 2048 x 1536

OLED/PLED





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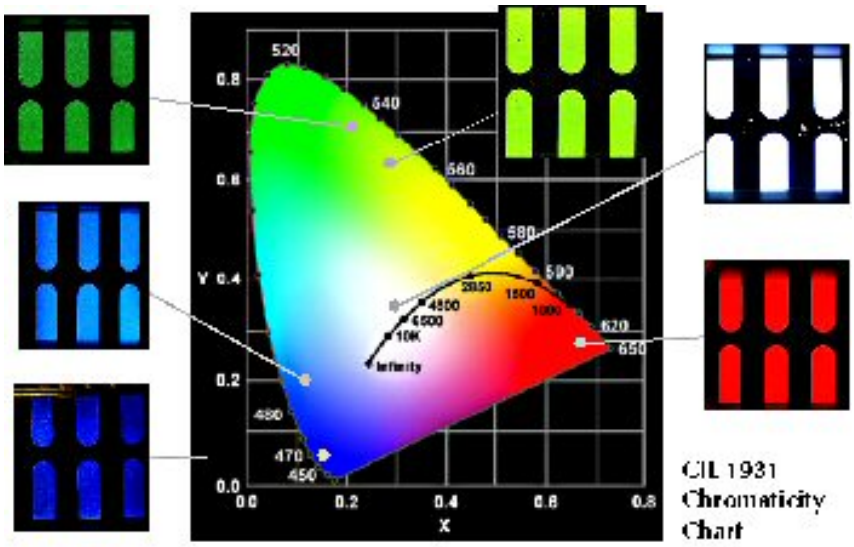
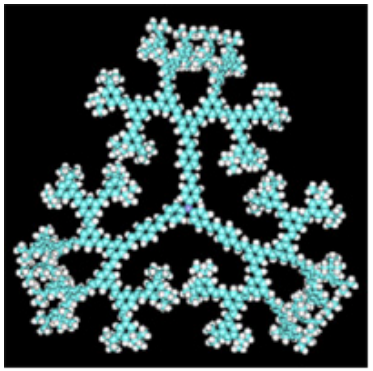
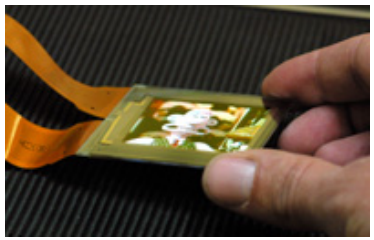
OLED/PLED



CIE 1931 Chromaticity Chart





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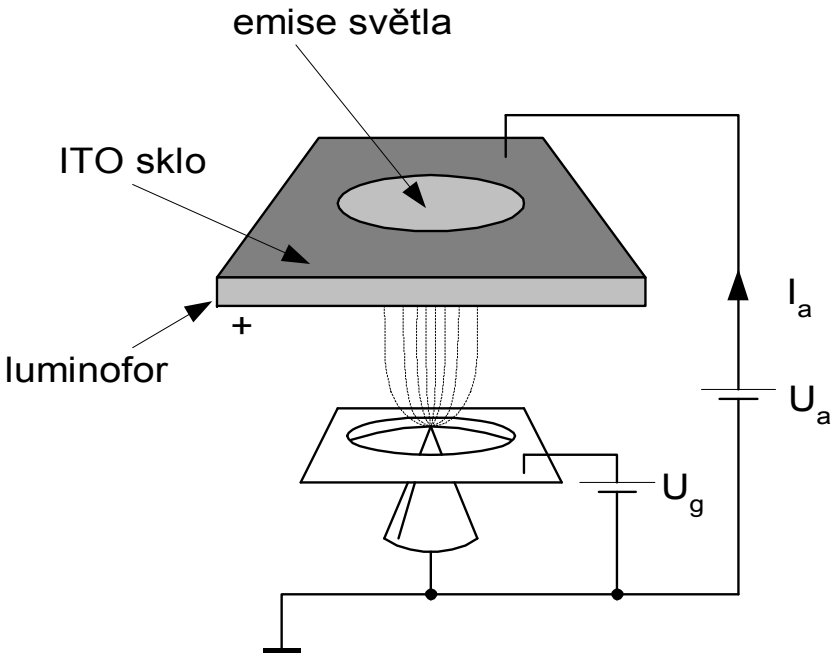
OBRAZOVÉ DISPLEJE

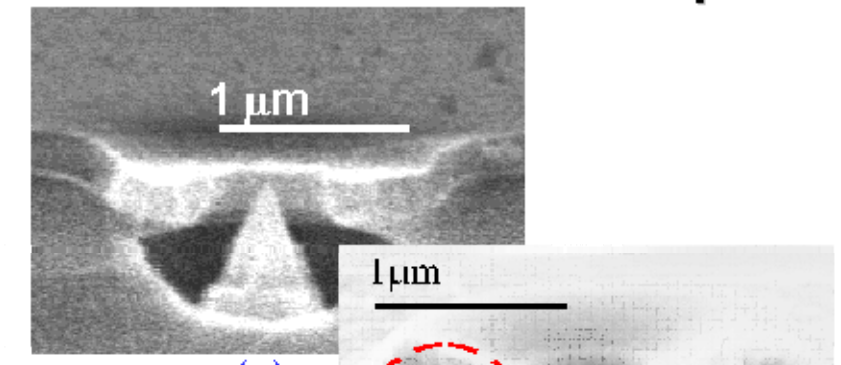
Field Emission Display



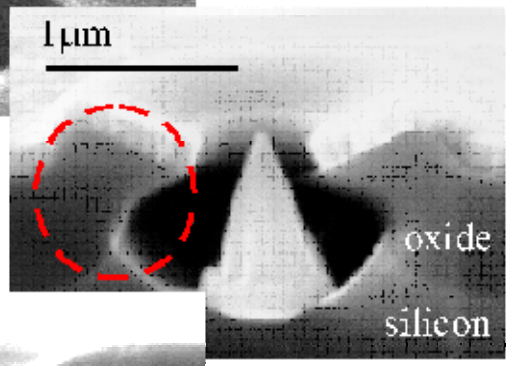
OBRAZOVÉ DISPLEJE

FED Research Activities at SMDL

Metal-Tip Field Emitters



(a)



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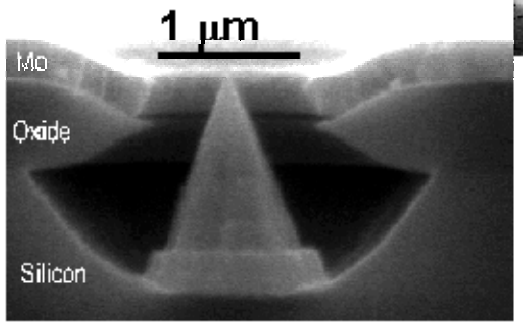

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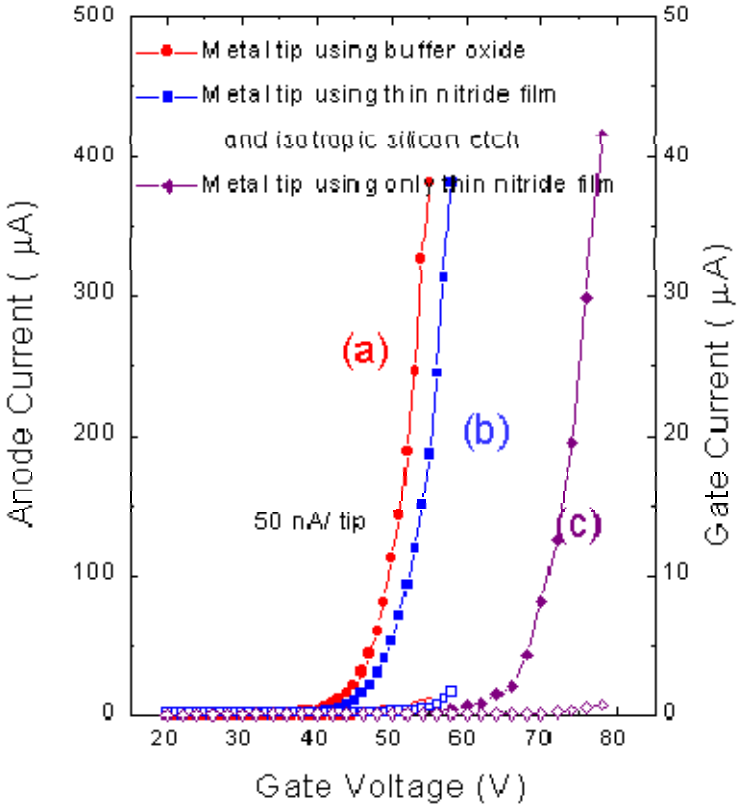
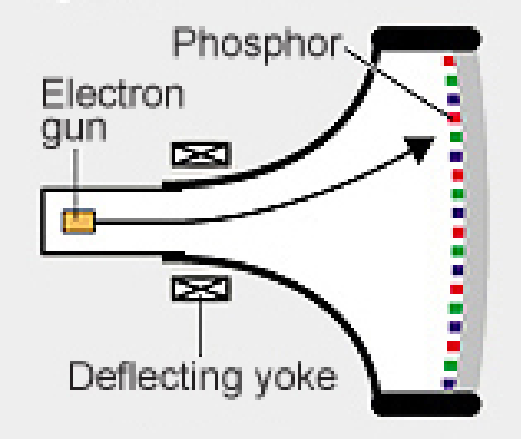
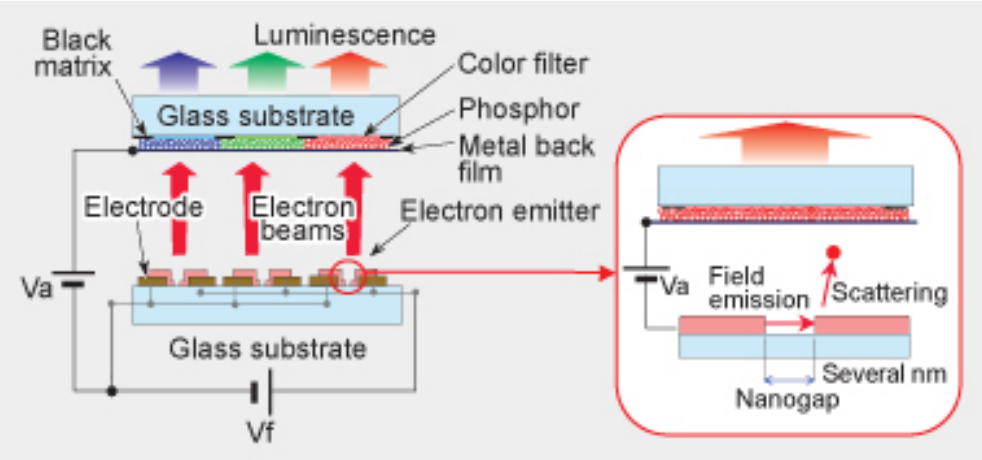
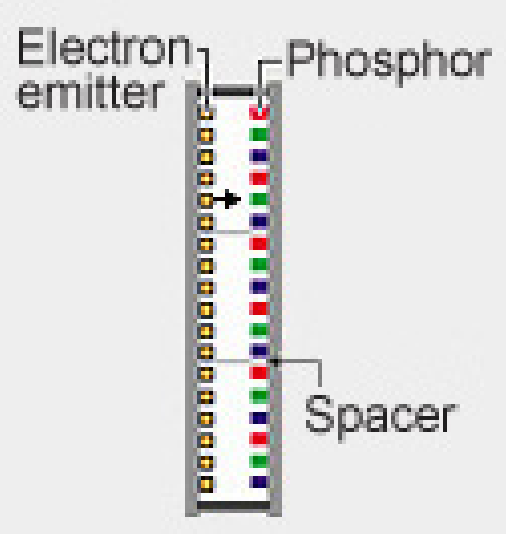


SED


Phosphor
Electron gun
Deflecting yoke


Black matrix
Luminescence
Color filter
Glass substrate
Phosphor
Metal back film
Electrode
Electron beams
Electron emitter
Va
Glass substrate
Vf
Va
Field emission
Scattering
Several nm
Nanogap


Electron emitter
Phosphor
Spacer

© CANON

Poslední stav - 2008:

PANASONIC 150" Plasma Display Advanced HD, 4k rozlišení

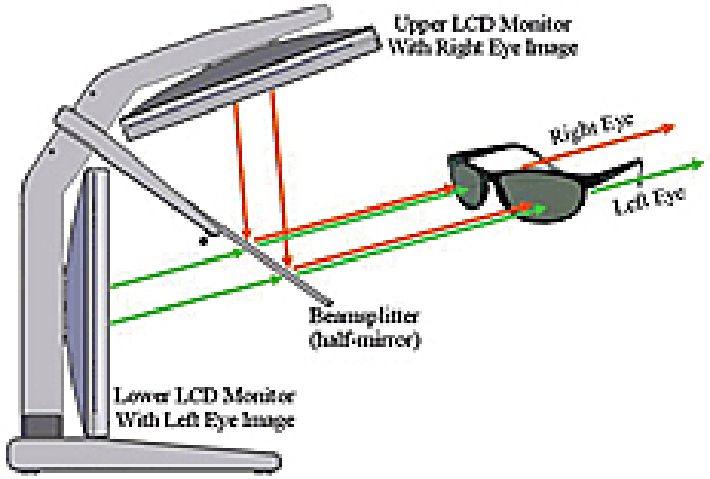
SONY OLED TV 82“. 1:1000000 kontrast, 4k, extrémně tenká

3D zobrazení – stereoskopický vjem

Principy:

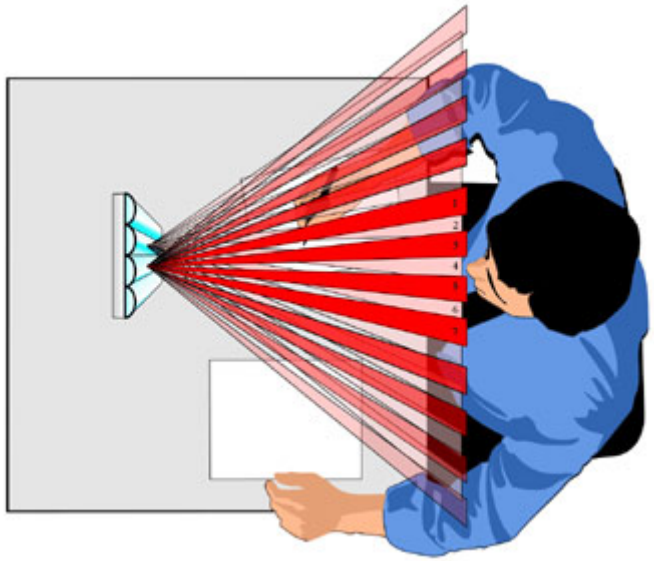
- brýle – barevné, polarizační, přepínané
- rastr válcových čoček
- autostereoskopický jev
- eye tracker
- relativní velikost, ztráta kontrastu, příčná rychlost ……

Stereoskopické displeje

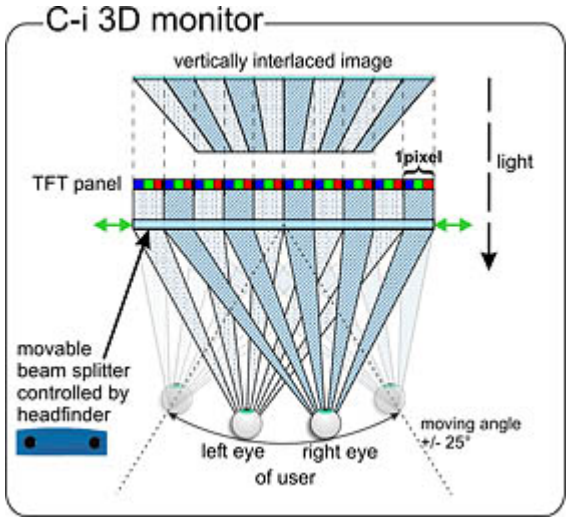


© Planar Systems

Stereoskopické displeje



rastr válcových čoček



eye tracker

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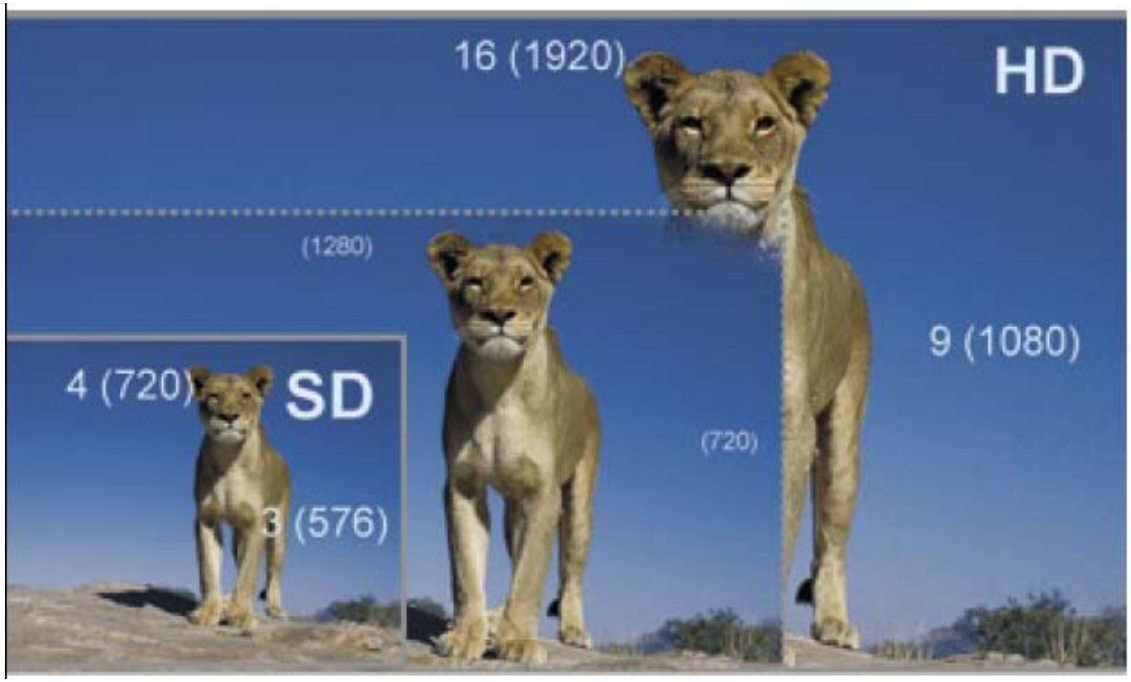
Formáty

- SDTV – 720x576, 4:3
- HDV – 720 řádků
- HDTV – 1080, 16:9
- UHDTV – 7680 x 4320 (32 mil.), 16:9 , 22 + 2

  16 x HDTV, 24 Gb/s, 180 – 600 Mb/s
- Digital Cinema 2K/4K

Formáty

Format	Approximate maximum horizontal viewing angle
720 lines x 1280 pixels (“720p”)	20°
1080 lines x 1920 pixels (“1080p/50-60”)	30°
2160 lines x 3840 pixels	60°
4320 lines x 7680 pixels	100°



© www.paladix.cz

Reference:

- G. Sharma, Digital Color Imaging Handbook, CRC Press, 2003
- ČSN 36 0010 Měření světla
- ČSN 01 1718 Měření barev
- http://www.paladix.cz (Radka Turčajová, Josef Hrubý)
- IEEE Signal Processing Magazine, 22, 1, Jan.2005